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2005 Annual Progress Report For Ground Water Remedy Optimization

Office of Superfund Remediation and Technology Innovation

1.0. Introduction

1.1 Purpose

The purpose of this Annual Report is to provide a summary and analysis of progress toward implementation of optimization recommendations at Superfund-financed Pump and Treat (P&T) sites. The report summarizes successful implementation strategies, opportunities for improvement, barriers to implementation, and changes in project costs as a result of optimization. The report also identifies sites requiring no further follow-up and discusses optimization reviews funded by the Regional program offices.

The main body of the report is accompanied by an appendix containing a summary of optimization recommendations by Region and site name. Regions are encouraged to review the appendix to assess progress in their respective programs. This Annual Report generally represents the status of optimization efforts in the Superfund program at the end of calendar year 2005.

1.2 Project Background

The Office of Solid Waste and Emergency Response (OSWER) developed the pilot Fund-lead P&T optimization initiative as part of the *FY2000-FY2001 Superfund Reforms Strategy* (OSWER 9200.0-33; July 7, 2000). Optimization is intended to facilitate systematic review and modification of existing P&T systems to promote continuous improvement, and to enhance overall remedy and cost effectiveness. In the Superfund program, optimization evaluations should be accomplished using the Remediation System Evaluation (RSE) process, a tool developed by the U.S. Army Corps of Engineers.

The pilot phase of the optimization initiative demonstrated that this effort offers measurable benefits in the form of cost savings and improved remediation systems. In August 2004, the Office of Superfund Remediation and Technology Innovation (OSRTI) developed the *Action Plan for Ground Water Remedy Optimization* ("2004 Action Plan") (OSWER 9283.1- 25; August 25, 2004) to further implement important lessons learned from the pilot phase and fully integrate optimization into the Superfund cleanup process where appropriate. Among other things, the Action Plan envisions an annual summary of progress concerning the implementation of recommended system changes.

1.3 Sites Subject to Optimization Reviews

There are currently fewer than 100 Superfund-financed P&T systems operating nationwide. To date, the Superfund program has conducted an optimization evaluation at 36 sites, most of which address this universe of Fund-financed P&T systems. The name, location and review date for these sites are listed in *Exhibit 1*.

The approach for selecting sites to receive an optimization review typically includes a review of annual operating costs, the age of the system, and concerns for remedy effectiveness or system efficiency. Ground water remedies with the highest annual operating costs likely offer

the greatest opportunities for cost savings and increased efficiency. RSEs may also be appropriate for systems that have been operating for two to four years, in order to maximize early opportunities for improvements and cost savings.

Regardless of annual operating costs or the age of the system, an optimization review may be valuable at sites where there are concerns about the effectiveness of the remedy or the efficiency of the P&T system. An RSE may also help address recommendations in Five-Year Reviews that identify similar concerns.

1.4 Monitoring Implementation Progress

Each site that receives an optimization review is subject to follow-up, typically in the form of annual conference calls between OSRTI and the Region, for at least two years after the RSE report is finalized. These follow-up discussions highlight the status of recommended changes and obstacles to implementation that require additional attention. Continuous oversight of progress at RSE sites helps maximize the benefits of optimization, identify lessons learned, and provide technical assistance. The appendix to this report generally represents the status of optimization efforts in the Superfund program at the end of calendar year 2005, based on the results of the most recent round of follow-up discussions. Additional information provided by site managers may also be used to supplement the appendix.

RSEs generate a number of suggestions, ideas, and recommendations which should be discussed and evaluated. Regions should weigh many factors including, but not limited to, technical feasibility, short-term implementation issues, long-term benefits, public and State acceptance, contractual requirements, effectiveness and availability of funding, when determining whether to implement optimization recommendations. Disagreements regarding the implementation of a particular recommendation are possible, and may be elevated to management for resolution.

If RPMs have questions regarding implementation of complex RSE recommendations, technical assistance is available from many sources, including Regional technical support staff, OSRTI staff and the RSE team, the EPA laboratories through the Technical Support Project, and the U.S. Army Corps of Engineers.

Exhibit 1. Sites with optimization reviews led by OSRTI

EPA Region	State	Site Name	Fiscal Year of Review ^(a)	Annual Reporting Status ^(b)
1	MA	Baird & McGuire	2001	complete
	NH	Savage Municipal Water Supply	2001	updated
	MA	Silresim Chemical Corp.	2001	complete
	MA	Groveland Wells	2002	updated
2	NY	Mattiace Petrochemical Co., Inc.	2001	complete
	NY	Claremont Polychmical	2001	updated
	NY	Brewster Well Field	2002	updated
	NJ	Bog Creek Farm	2002	updated
	NY	SMS Instruments, Inc.	2003	updated
	NJ	Higgins Farm	2003	updated
	NY	Circuitron Corp.	2004	updated
3	PA	Hellertown Manufacturing	2001	complete
	PA	Raymark	2001	complete
	PA	Havertown PCP	2003	updated
	VA	Greenwood Chemical Co.	2003	updated
4	NC	FCX, Inc. (Statesville Plant)	2000	updated
	SC	Elmore Waste Disposal	2000	updated
	NC	Cape Fear Wood Preserving	2004	updated
	FL	American Creosote Works, Inc. (Pensacola Plant)	2006	new
5	MN	MacGillis and Gibbs Co./Bell Lumber & Pole Co.	2000	complete
	WI	Oconomowoc Electroplating	2000	updated
	MI	Ott/Story/Cordova Chemical Co.	2001	updated
	IN	Douglas Road/Uniroyal, Inc., Landfill	2004	updated
	IN	Reilly Tar & Chemical Corp. (Indianapolis Plant)	2004	updated
	MI	Peerless Plating Co. Inc.	2005	new
	WI	Penta Wood Products	2006	new
6	AR	Midland Products	2001	complete
	LA	Bayou Bonfouca	2001	complete
7	NE	Cleburn Street Well	2001	updated
8	CO	Summitville Mine	2002	complete
9	CA	Modesto Ground Water Contamination	2001	updated
	CA	Selma Treating Co.	2002	complete
10	WA	Commencement Bay, South Tacoma Channel	2001	updated
	OR	McCormick & Baxter	2001	complete
	WA	Boomsnub/Airco	2002	updated
	WA	Wyckoff Co./Eagle Harbor	2004	updated

(a) Date refers to date of site visit; RSE reports may be finalized months later, following multiple-party review.

(b) *Complete* sites were documented as such in the 2004 annual report; *new* sites have not yet been subject to formal followup discussions, progress of *updated* sites is included in the appendix to this report. Only *updated* sites are included in the analyses contained in this report.

2.0 Summary of Implementation Progress

2.1 Overview

Each of the RSEs resulted in an improved understanding of the operating P&T systems and identified a number of opportunities for improvements in efficiency and effectiveness. The RSE reports specifically highlight recommendations in the following four categories:

- recommendations to improve remedy effectiveness,
- recommendations to reduce operating costs,
- recommendations for technical improvement, and
- recommendations to expedite site closure.

The annual follow-up discussions between OSRTI and the Remedial Project Manager (RPM) assess progress with the implementation of each recommendation contained in the RSE reports. *Exhibit 2* summarizes progress in each of the four categories of recommendations. The subsequent sections provide an analysis of implementation progress and highlights of site-specific progress. The data included in this report represents only the sites that are still subject to the designated follow-up process (listed as status “updated” in *Exhibit 1*). Sites that completed the follow-up process, as documented in the previous progress report, are no longer referenced here.

Exhibit 2. Status of optimization recommendations

Types of Recommendations	Implementation Status					
	Implemented	In progress	Planned	Declined	Deferred to PRP/State	Under Consideration
Remedy Effectiveness (69 total)	68% (47)	11.5% (8)	11.5% (8)	3% (2)	3% (2)	3% (2)
Cost Reduction (86 total)	53.5% (46)	9.3% (8)	5.8% (5)	21% (18)	1% (1)	9.3% (8)
Technical Improvement (66 total)	66.6% (44)	6% (4)	1.5% (1)	12% (8)	3% (2)	11% (7)
Site Closure (27 total)	26% (7)	33% (9)	--	11% (3)	7% (2)	22% (6)
Overall Progress (248 total)	58% (144)	12% (29)	5.5% (14)	12.5% (31)	3% (7)	9% (23)

Note: Numbers in parentheses represent actual number of recommendations, used to calculate rounded percentages.

RPMs have made positive efforts to address more than 90% of all recommendations made to date; only 9% of the RSE recommendations remain under consideration. On the whole, this represents a small decline in the recommendations that remain to be addressed since the last progress report. However, it is important to highlight the significant improvement in the percentage of recommendations now fully implemented, from 50% in 2004 to 58% in 2005.

2.2 Implementation of Remedy Effectiveness Recommendations

A thorough review of remedy effectiveness continues to be a principal element of OSRTI's optimization evaluations. Recommendations to improve effectiveness predominantly suggest more rigorous evaluation of the extraction and subsurface portions of the remedy rather than the above-ground treatment portion. The most common recommendations in this category generally relate to plume delineation, additional characterization or sampling, and improved data collection and/or reporting.

RSE recommendations with respect to plume delineation continue to identify the need for capture zone analyses, the development of updated plume maps, or new ground water flow or contaminant transport modeling. Approximately 68% of remedy effectiveness recommendations have been implemented and another 25% are in progress or planned for the near-term. This is a marked improvement over the last progress report, at which time 56% percent of these recommendations were complete. The time required to consider or implement these changes varies, and may be assessed by reviewing the detailed information in the appendix.

2.3 Implementation of Cost Reduction Recommendations

RSE recommendations pertaining to cost reduction may cover many aspects of system operation, including the selection of treatment technologies, operator and laboratory labor, and project management. A common recommendation for cost reduction typically calls for site managers to reduce or eliminate ground water or process monitoring that is no longer necessary once a system is operating at steady-state.

RSEs continue to identify opportunities to reduce operator or onsite labor without sacrificing the effectiveness of the remedy. Such reductions should be expected following system shakedown or automation, when a system is operating at steady-state. Furthermore, some treatment components become inefficient or unnecessary as a result of changing site conditions or due to conservative estimates during the design phase. Simplifying a treatment system under such conditions has resulted in reduced material usage, utilities, and labor.

Approximately 54% of cost-reduction recommendations have been implemented to date. OSRTI and the States continue to experience cost savings and improved efficiencies associated with optimizing long-term P&T systems. However, documenting precise cost savings and expenditures directly related to RSE implementation continues to pose a challenge. To maximize cost savings for EPA, it may be beneficial to implement recommendations that offer the greatest potential reduction in annual operating costs as early as possible during the LTRA phase.

The highlight below provides an example of successful implementation of cost reduction recommendations.

Highlight: Success with Cost Reduction Recommendations

Cape Fear Wood Preserving: The RSE Team recommended that the site team contract O&M services and ground water sampling to a local contractor, instead of paying travel expenses associated with the existing contract arrangement.

The site team quickly responded to this recommendation by adjusting the contract for O&M services. A local contractor, located within one hour of the site, is now used for basic O&M and sampling. This change also allowed the site team to adjust the method of utility payment to avoid previous mark ups. The site team estimates that these changes have contributed to a 40% reduction in monthly O&M costs (in labor and utilities).

2.4 Implementation of Technical Improvement Recommendations

Technical improvement recommendations cover a wide range of items to improve overall site operations. The RSE reports contain a total of 66 recommendations in this category. As *Exhibit 2* demonstrates, two-thirds (66%) of these recommendations have been fully implemented, a significant improvement over the last progress report (57%). RPMs continue to implement the majority of these recommendations shortly after the RSE site visit highlights opportunities for improvement. These types of recommendations are generally easy to implement, require little up front funding, and are not typically contingent on other recommendations. Examples of technical improvement recommendations include the following:

- Clean, repair or replace faulty equipment,
- Rehabilitate fouled extraction or injection wells,
- Improve or streamline data evaluation protocols,
- Reformat O&M reports, and
- Modify sampling protocols.

2.5 Implementation of Site Closure Recommendations

RSEs continue to identify opportunities to accelerate progress toward achieving final cleanup goals and eventual site closure. These recommendations most commonly involve developing a clear and comprehensive exit strategy and/or evaluating alternate remedial approaches.

An exit strategy usually details the specific steps for achieving closeout of the remedy or various components of the remedy. Developing an exit strategy typically involves establishing clear and valid cleanup goals, then determining the specific data and criteria to be used to evaluate if goals are met such that some or all of the system can be shut down. If the intermediate goals and milestones are not met, RPMs should then consider alternatives to the current system. This may include alternate technologies to replace P&T, or to supplement it with more aggressive source removal.

More than one-quarter (26%) of recommendations associated with site closure have been implemented, which is an improvement over the last progress report (21%). An additional one-third (33%) of these recommendations are currently in progress. Exit strategy recommendations, while valuable in the long-term, often are considered after effectiveness and cost reduction recommendations are implemented. In addition, consideration of supplemental or alternative remedial technologies generally requires higher expenditures than what is expected for routine O&M, and may require changes to site decision documents (e.g., an amended Record of Decision). For these reasons, the data continue to show a lower percentage of these recommendations implemented, while many are still under consideration.

The highlight below provides two examples of successful implementation of supplemental technologies for source removal that could allow earlier shutdown of existing P&T systems.

Highlight: Success with Recommendations to Expedite Site Closure

Selma Treating Co. Site: In 2005, EPA Region 9 began a pilot test for *in situ* bioremediation to enhance the effectiveness of the existing P&T. Molasses injection successfully converted Chromium VI to less toxic and less mobile Chromium III in a highly contaminated source area. The pilot effort has since been expanded, and the P&T system has become more effective at treating lower levels of residual Cr(VI). As a result, the Region fully expects the bioremediation effort to reduce the duration of P&T operations by several decades.

SMS Instruments Site (Update since 2004 Annual Report): The air sparging system began operation in April 2005, then the remedy transferred to the State in July for O&M. The State discontinued P&T two months later, based on progress with the air sparging system. EPA Region 2 and the State estimate that conditions may be appropriate to discontinue active remediation in mid-2006. The State is currently operating the remedy for approximately \$5,000 per month, compared to \$30,000 per month for the previous P&T remedy (nearly 85% reduction in annual operating costs).

2.6 Sites Requiring No Further Follow-Up

As shown in *Exhibit 2*, RPMs continue to demonstrate a commitment to the implementation of RSE recommendations. In fact, the optimization process is complete at a number of sites as a result of the successful implementation or thorough consideration of all RSE recommendations. OSRTI is no longer conducting annual follow-up discussions at these particular sites, though assistance is still available to site managers in the event that any optimization-related issues arise.

OSRTI has also completed the follow-up process for a number of sites where EPA is no longer responsible for operating or optimizing the P&T system. Included here are sites where the State now has responsibility for operation and maintenance of the remedy, or where the P&T system is no longer operating. *Exhibit 3* highlights the two sites that completed the follow-up process in 2005.

As demonstrated in the appendix to this report, there are nearly a dozen sites at which efforts to implement the last one or two recommendations are currently underway. OSRTI expects to report on a larger number of sites having completed the follow-up process in the next annual report.

Exhibit 3. Sites requiring no further follow-up

Rationale	Site Name
Successful implementation and/or thorough consideration of all RSE recommendations	SMS Instruments
Long-Term Response Action (LTRA) is complete; State is now responsible for operation and maintenance (O&M)	Commencement Bay/South Tacoma Channel

3.0 Related Initiatives

3.1 Region 3 “Regional Optimization Evaluation Team”

EPA Region 3 completed the Regional Optimization Program that began in 2004. The program included streamlined reviews (RSE-Lites) for twelve Fund-financed P&T sites and systematic tracking of recommendations and site milestones. Overall, the effort identified the potential for more than \$1 million in capital cost savings, as well as annual savings of more than \$100,000. In addition to cost savings, these reviews generated recommendations related to remedy effectiveness and site closeout that are generally consistent with sites in other Regions.

Region 3 concluded that the use of an independent evaluation team, combined with the nature of their team approach, resulted in a high degree of interaction and shared knowledge across all levels. OSRTI is currently considering how to apply this experience to other Regions.

3.2 Optimization Evaluations Led by Regions

Lang Property (Pemberton Township, NJ)

EPA Region 2 sought input from the Army Corps of Engineers (USACE) and EPA’s own Environmental Response Team (ERT) to optimize the existing approach to ground water remediation. ERT was instrumental in delineating the nature and extent of an area of contaminated soil, which was a contributing source to ground water contamination. ERT recommended a pilot *in situ* effort, which had mixed results due to site-specific conditions. USACE then recommended excavation, which was very successful. USACE’s optimization effort also included the conversion of existing monitoring wells to reinjection wells, to assist in the disposal of water generated as a result of the excavation.

Mohonk Road Industrial Plant (High Falls, NY)

Significant implementation progress has occurred at this site, following the 2004 RSE by a team of staff from EPA Region 2 and the Army Corps of Engineers. Vapor intrusion evaluation of residential homes has been conducted over the past two heating seasons. Several of the recommendations associated with reporting and sampling location modifications were implemented as well. The acid delivery system modifications at the groundwater treatment facilities were also implemented. All other recommendations remain under consideration.

4.0 Future Plans

OSRTI expects to continue to fund independent, technical experts to conduct additional RSEs and streamlined RSE-Lites each year. OSRTI will continue to select sites for future reviews based on annual operating costs, the age of the system, and concerns for remedy effectiveness and system efficiency. Regions should contact OSRTI to recommend any sites that may benefit from an optimization review.

Consistent with the *Action Plan for Ground Water Remedy Optimization* (OSWER 9283.1-25; August 2004), each Region should pursue an RSE at a minimum of one site each year, where suitable candidate sites exist. Contractual access to OSRTI's RSE experts may be made available to the Regions for this purpose, if needed.

OSRTI will continue to utilize the existing process for follow-up discussions in order to monitor progress with the implementation of RSE recommendations. Follow-up will continue at all sites, with the exception of those identified in Section 2.6 of this report. RPMs may request technical assistance to aid in the implementation of system changes.

5.0 References

5.1 Internet Resources

OSRTI, Post-Construction Program Area

- Guidance for post-construction completion activities, with optimization project updates
- <http://www.epa.gov/superfund/action/postconstruction/index.htm>

OSRTI, Hazardous Waste Clean-Up Information (CLU-IN) web site

- Site-specific RSE reports and recommendations
- <http://www.clu-in.org/optimization>

U.S. Army Corps of Engineers, Hazardous, Toxic and Radioactive Waste Center of Expertise

- RSE checklists and scope of work, provided by developers of the RSE tool
- <http://www.environmental.usace.army.mil/library/guide/rsechk/rsechk.html>

Federal Remediation Technologies Roundtable

- Case studies, conference materials and more, compiled by an inter-agency workgroup
- <http://www.frtr.gov/optimization.htm>

5.2 Guidance and Fact Sheets

Effective Contracting Approaches for Operating Pump and Treat Systems (OSWER 9283.1-21FS / EPA 542-R-05-009; April 2005)

O&M Report Template for Ground Water Remedies (With Emphasis on Pump and Treat Systems) (OSWER 9283.1-22FS / EPA 542-R-05-010; April 2005)

Cost-Effective Design of Pump and Treat Systems (OSWER 9283.1-20FS / EPA 542-R-05-008; April 2005)

Action Plan for Ground Water Remedy Optimization (OSWER 9283.1-25; August 25, 2004)

Pilot Project to Optimize Superfund-financed Pump and Treat Systems: Summary Report and Lessons Learned (OSWER 9283.1-18; November 2002)

Elements for Effective Management of Operating Pump and Treat Systems (OSWER 9355.4-27FS-A; November 2002)

Implementation of RSE Recommendations: Technical Assistance Resources Available to RPMs (January 2002)

5.3 General Project Documentation

2004 Annual Progress Report for Ground Water Remedy Optimization (OSWER 9283.1-27; August 2005)

Groundwater Pump and Treat Systems: Summary of Selected Cost and Performance Information at Superfund-financed Sites (EPA 542-R-01-021a; December 2001)

Superfund Reform Strategy, Implementation Memorandum: Optimization of Fund-lead Ground Water Pump and Treat (P&T) Systems (OSWER 9283.1-13; October 31, 2000)